

What is claimed is:

1. A circuit for reversible trimming a matching resistor to a reference resistor  
wherein the matching resistor material comprises a programmable resistance material,  
the circuit comprising  
a resistor bridge network comprising a reference resistor and a matching resistor;  
a comparator circuit in communication with the resistor bridge network  
for comparing the resistance states of the reference resistor and the matching resistor and  
for generating a comparing signal indicative of the difference between the reference resistor and the matching resistor; and  
a pulse feedback circuit to the resistor bridge network, the feedback circuit coupled to the comparator circuit and providing a pulsed electrical signal to the matching resistor corresponding to the comparing signal.
2. A circuit as in claim 1 wherein the programmable resistance material is selected from a metal-amorphous silicon-metal material, a phase change material or a thin film perovskite material.

3. A circuit as in claim 1 wherein the feedback circuit provides a pulsed electrical signal to modify the resistance of the matching resistor, the pulse electrical signal having the polarity, the amplitude or the duration corresponding to the comparing signal from the comparator circuit.
4. A circuit as in claim 1 wherein the pulsed electrical signal has duration between 100 fs and about 1000 ns, and amplitude between 0.1 V and about 100 V.
5. A circuit for reversible trimming a matching resistor to a reference resistor  
wherein the matching resistor material comprises a programmable resistance material,  
the circuit comprising  
a resistor bridge network comprising a reference resistor and a matching resistor;  
a comparator circuit in communication with the resistor bridge network  
for comparing the resistance states of the reference resistor and the matching resistor and

for generating a comparing signal indicative of the difference between the reference resistor and the matching resistor; and a first transmission gate coupled between the resistor bridge network and the input of the comparator circuit; a pulse feedback circuit to the resistor bridge network, the feedback circuit coupled to the comparator circuit and comprising a second transmission gate; wherein the timing of the transmission gates is such that the first transmission gate is pulsed open for the comparator circuit to compare the resistance states of the resistor bridge network and to generate a comparing signal and the second transmission gate is pulsed open after the close of the first transmission gate to propagate the comparison signal to the resistor bridge network.

6. A circuit as in claim 5 wherein the resistor network is a resistance bridge comprising a reference resistor, a pulse adjustable resistor and two resistors with equal resistance.
7. A circuit as in claim 5 wherein the comparator circuit is a differential amplifier.

8. A circuit as in claim 5 wherein the transmission gate is a single transistor.
9. A circuit as in claim 5 further comprising a delay circuit between the output of the comparator circuit and the input of the pulse feedback circuit.
10. A circuit as in claim 5 wherein the pulsed signal to pulse open the first transmission gate has durations between 5 ns to 100 ns.
11. A circuit as in claim 5 wherein the pulsed signal to pulse open the first transmission gate has amplitudes between 0.1 V and about 100 V.
12. A circuit as in claim 5 wherein the programmable resistance material is selected from a metal-amorphous silicon-metal material, a phase change material or a thin film perovskite material.
13. A circuit as in claim 12 wherein the metal-amorphous silicon-metal material comprises boron doped amorphous silicon layer located between two electrodes, one electrode being Cr and the other being V, Co, Ni, Pd, Fe or Mn.

14. A circuit as in claim 13 wherein the phase change material comprises at least one chalcogen and one or more transition metals.
15. A circuit as in claim 14 wherein the thin film perovskite material is selected from a group of materials consisting of colossal magnetoresistive materials and high temperature superconducting materials.
16. A circuit as in claim 15 wherein the thin film perovskite material is selected from a group consisting of PrCaMnO (PCMO), LaCaMnO (LCMO), LaSrMnO (LSMO), LaBaMnO (LBMO), LaPbMnO (LPMO), NdCaMnO (NCMO), NdSrMnO (NSMO), NdPbMnO (NPMO), and LaPrCaMnO (LPCMO), GdBaCoO (GBCO) and mixtures and combinations thereof.
17. A method of reversible trimming a matching resistor to a reference resistor  
wherein the matching resistor material comprises a programmable resistance material,  
the method comprising  
comparing the matching resistor to the reference resistor;  
generating a comparing signal indicative of the difference between the reference resistor and the matching resistor;

applying a pulsed electrical signal to the matching resistor, the pulsed electrical signal corresponding to the comparing signal.

18. A method as in claim 17 further comprising the repetition of the above steps until the resistances of the matching resistor and the reference resistor are matched.
19. A circuit as in claim 17 wherein the programmable resistance material is selected from a metal-amorphous silicon-metal material, a phase change material or a thin film perovskite material.
20. A circuit as in claim 17 wherein the feedback circuit provides a pulsed electrical signal to modify the resistance of the matching resistor, the pulse electrical signal having the polarity, the amplitude, or the duration corresponding to the comparing signal from the comparator circuit.

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